

REMARKS

Claims 1 and 5-10 are pending in the present application.

The presently claimed invention provides, *inter alia*, a process for preparing trichlorosilan (HSiCl_3) by catalytic hydrodehalogenation of silicon tetrachloride (SiCl_4) in the presence of hydrogen and a supported catalyst at a temperature in the range from 300 to 1000°C,

wherein said supported catalyst comprises at least one metal or metal salt selected from the group consisting of calcium, strontium, barium, calcium chloride, strontium chloride, and barium chloride, and

wherein said at least one metal or metal salt has been applied to a support selected from the group consisting of leached glass, fused silica, a porous siliceous support and a SiO_2 support. (see Claim 1)

Applicants submit that for the reasons given below, the claimed invention is novel and non-obvious. Reconsideration of the outstanding rejections is requested.

The rejection of Claims 1-10 under 35 U.S.C. §103(a) over Roewer et al (US 5,716,590) in view of Corbin et al (US 5,600,040) is respectfully traversed.

As stated above, the claimed invention is drawn to “a process for preparing trichlorosilan (HSiCl_3) by catalytic hydrodehalogenation of silicon tetrachloride (SiCl_4) in the presence of hydrogen, in which at least one metal or metal salt selected from among the elements of main group 2 of the Periodic Table of the Elements is used as catalyst at a temperature in the range from 300 to 1000°C.” (see Claim 1) The Examiner continues to allege, for at least the third time, that the claimed invention is obvious over the combination

of Roewer et al (US 5,716,590) and Corbin et al (US 5,600,040). Applicants submit that this rejection remains to be without merit. Specifically, Applicants maintain that there is nothing in either Roewer et al or Corbin et al to support the Examiner's alleged obviousness position with respect to the replacement of a transition metal in the catalyst system of Roewer et al with an alkaline earth element disclosed by Corbin et al for the reasons of record.

Roewer et al is discussed at page 1, lines 13-25 of the present specification, from which the several advantages and differences of the claimed invention are apparent. Indeed, the Examiner continues to recognize that the claimed method differs from the disclosure of Roewer et al in that this reference does not disclose or suggest the claimed method by using "at least one metal or metal salt selected from among the elements of main group 2 of the Periodic Table of the Elements... as catalyst at a temperature in the range from 300 to 1000°C". However, the Examiner indicates that Roewer et al disclose hydrodehalogenation in the presences of hydrogen and a supported catalyst at a temperature of 300 - 1000°C.

The Examiner continues to rely upon Corbin et al as allegedly providing motivation to utilize a Group 2 element in a catalytic hydrodehalogenation reaction. This allegation is based on the Examiner's assertion that Corbin et al disclose a "process to separate HFC-134 isomers (HFC-134 or HFC-134a by hydrodehalogenation). On page 6 of the Office Action, the Examiner provides an additional alleged basis for why it would have been "obvious" to use a Group 2 element in a catalytic hydrodehalogenation reaction. Specifically, the Examiner alleges "the sorbent of Crobin has the same function as a catalyst in fluidized bed or reactors therefore it would have been obvious... to replace the transition metal of Roewer with the alkali metals of Corbin to solve the problem of silicides formation."

Applicants disagree with this position taken by the Examiner, as well as the ultimate conclusion of obviousness. Specifically, the sorbent disclosed by Corbin et al serve a very

different purpose that the transition metals in Roewer. Indeed, Corbin et al do not disclose the catalytic conversion of $\text{CF}_3\text{CH}_2\text{F}$ (HFC-134a) or CHF_2CHF_2 (HFC-134), but rather relates to the *separation* of these $\text{C}_2\text{H}_2\text{F}_4$ isomers from a mixture of the same by preferential sorption on certain activated carbons and inorganic molecular sieves at a temperature and pressure suitable for sorption. With respect to the temperature, at column 5, lines 13-14, Corbin et al specifically disclose that sorption temperatures range from -20°C to 300°C and all Examples are performed at less than 300°C (i.e., at a temperature that is preferably lower than the claimed temperature of catalysis).

Thus, the role of the sorbents in Corbin et al is “to improve the HFC-134 sorption efficiency” (see column 3, lines 61-65). In other words, the role of the sorbents in Corbin et al is to facilitate separation of the $\text{C}_2\text{H}_2\text{F}_4$ isomers. In contrast, in Roewer et al the transition metals serve to facilitate catalytic hydrodehalogenation. Clearly, these roles are distinct.

Moreover, Applicants submit that there is absolutely not technical basis to believe that catalytic purification of halohydrocarbons can be advanced as a relevant citation for evaluation of a reaction of silicon tetrachloride. The differences alone between SiCl_4 and CCl_4 in terms of their reactivity already make this distinction clear. Further, to bring fluorohydrocarbons into consideration in comparison to SiCl_4 lacks credibility, by virtue of the C-F polarity. The polarity and the steric aspects of C-F- as well as Si-Cl- structures are so different that even the comparison in a catalytic process would lack credibility to the skilled artisan. The teaching of Corbin is in no way capable of making the subject matter of the present invention obvious.

In view of the foregoing, even if the artisan were to combine the disclosures of Roewer et al and Corbin et al, the motivation would not be to substitute the transition metal in the catalyst system of Roewer et al with an alkaline earth element disclosed by Corbin et al as

alleged by the Examiner. The motivation instead would be to add the separation step disclosed by Corbin et al after the hydrodehalogenation reaction step disclosed by Roewer et al. However, this is not what Applicants claim.

Again, for sake of completeness, with respect to Roewer et al (US 5,716,590), which corresponds to EP 0 658 359 A2, the Examiner is reminded of the discussion at page 1, lines 13-25 of the present specification, which states:

Various catalysts and the process for converting SiCl_4 to HSiCl_3 in the presence of hydrogen have been known for a long time.

Thus, EP 0 658 359 A2, for example, discloses a process for the catalytic hydrodehalogenation of SiCl_4 to HSiCl_3 in the presence of hydrogen, in which finely divided transition metals or transition metal compounds selected from the group consisting of nickel, copper, iron, cobalt, molybdenum, palladium, platinum, rhenium, cerium and lanthanum are used as unsupported catalysts, these are able to form silicides with elemental silicon or silicon compounds. Problems are, as a result of the strongly endothermic nature of the reaction, the indirect introduction of the heat of reaction and the sintering of the catalyst particles, associated with a drop in activity. In addition, separation of the used finely divided catalysts from the product mixture represents a considerable expense.

Indeed, from the foregoing, it is clear that the present invention provides an advantage over Roewer et al in that the catalytic hydrodehalogenation of SiCl_4 to HSiCl_3 in the presence of hydrogen can be conducted at reduced expense and without the activity drop associated with the strongly endothermic nature of the reaction, the indirect introduction of the heat of reaction and the sintering of the catalyst particles that plagued the method of Roewer et, which utilized finely divided transition metals or transition metal compounds selected from the group consisting of nickel, copper, iron, cobalt, molybdenum, palladium, platinum, rhenium, cerium and lanthanum as unsupported catalysts.

Moreover, with respect to the temperature, at column 5, lines 13-14, Corbin et al specifically disclose that sorption temperatures range from -20°C to 300°C and all Examples

are performed at less than 300°C (i.e., at a temperature that is preferably lower than the claimed temperature of catalysis).

Accordingly, Applicants again submit that there is nothing in the cited art that would lead the artisan to any realization that transition metals will be comparable to group 2 metals or group 2 salts with respect to catalytic ability for hydrohalogenation as presently claimed.

In view of the foregoing, Applicants respectfully request withdrawal of this ground of rejection.

Applicants submit that the present application is now in condition for allowance.
Early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, L.L.P.
Richard L. Treanor, Ph.D.



Vincent K. Shier, Ph.D.
Registration No. 50,552

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413-2220
(OSMMN 08/03)